2

Diagnosis, Assessment, and Monitoring Outcomes in PTSD

Terence M. Keane, Ph.D.
Danny G. Kaloupek, Ph.D.

Posttraumatic stress disorder (PTSD) was first included in the diagnostic nomenclature of the American Psychiatric Association in 1980. Since that time, there has been excellent progress in the psychological assessment of PTSD. PTSD is a psychological condition that can develop in individuals after exposure to major life stressors (American Psychiatric Association 1994) and is characterized by a range of symptoms. Among the prominent symptoms of PTSD are distressing thoughts, feelings, and images that recapitulate the traumatic event, a persistent avoidance of cues associated with the traumatic event, emotional numbing of responsiveness, and a collection of symptoms that represent a persistent increase in stress and arousal. Typically, the disturbance is experienced for longer than 1 month and causes clinically significant distress or impairment in occupational and social functioning. Capturing the diversity of symptoms in PTSD has constituted a significant challenge to those involved in the development of assessment instruments. Yet it is clear that this challenge has been successfully met with an assortment of diagnostic interviews and psychological tests (Keane et al. 2000).

For a diagnosis of PTSD to be made, an individual must have been exposed to a traumatic event that involved a life-endangering component. The individual's response had to include intense fear, helplessness, or hor-

ror. If symptom duration is less than 3 months, acute PTSD is diagnosed; if duration extends beyond 3 months, the condition is considered to be chronic. In some individuals, symptoms emerge months or even years after the traumatic event. In these cases a diagnosis of PTSD with delayed onset is considered.

Diagnostic Criteria for PTSD

Fortunately, most people who are exposed to a traumatic event recover over time. For a sizable minority, however, symptoms of PTSD occur and in the absence of treatment can cascade into the development of a persistent and disabling psychiatric condition. A person with PTSD reexperiences symptoms that include recurrent and intrusive recollections of the event; recurrent dreams of the event; feeling as if the event were recurring; intense distress at exposure to cues that symbolize the event; and physiologic reactivity to cues or reminders of the event (Table 2–1).

The disorder also encompasses symptoms of avoidance and emotional numbing. These can include efforts to avoid thoughts, feelings, or even conversations of the event; efforts to avoid activities, places, or people associated with the event; an inability to recall important details surrounding the event; a diminished interest in formerly enjoyable activities of life; a feeling of detachment, estrangement, or alienation from other people; a restricted range of emotional experiences; and a sense of a shortened future accompanied by a notable lack of preparation for the future.

In addition, symptoms of arousal that were not present before the traumatic event complete the symptom picture. These arousal symptoms can be sleep problems, irritability or anger outbursts, difficulty concentrating, hypervigilance for danger or a recurrence of a life-threatening situation, or exaggerated startle response.

Relevance of Traumatic Events

Although it was formerly thought that exposure to traumatic events was rare, recent epidemiological research has challenged this notion. Norris (1992) studied four urban areas in the southern United States and found that 69% of adults reported experiencing one or more traumatic events in their lives. Resnick et al. (1993) conducted a nationwide survey of victimization among women and found that 69% reported being victimized at least once in their lives. Breslau et al. (1991) found that 39% of participants in their epidemiological study experienced a traumatic event. These participants were a relatively young, well-educated, and insured population. Even college student populations reported high rates of exposure to trau-

TABLE 2–1. DSM-IV-TR diagnostic criteria for PTSD

A. The person has been exposed to a traumatic event in which both of the following were present:
   (1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
   (2) the person's response involved intense fear, helplessness, or horror. **Note:** In children, this may be expressed instead by disorganized or agitated behavior.

B. The traumatic event is persistently reexperienced in one (or more) of the following ways:
   (1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. **Note:** In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
   (2) recurrent distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognizable content.
   (3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children, trauma-specific reenactment may occur.
   (4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
   (5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:
   (1) efforts to avoid thoughts, feelings, or conversations associated with the trauma
   (2) efforts to avoid activities, places, or people that arouse recollections of the trauma
   (3) inability to recall an important aspect of the trauma
   (4) markedly diminished interest or participation in significant activities
   (5) feeling of detachment or estrangement from others
   (6) restricted range of affect (e.g., unable to have loving feelings)
   (7) sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:
   (1) difficulty falling or staying asleep
   (2) irritability or outbursts of anger
   (3) difficulty concentrating
   (4) hypervigilance
   (5) exaggerated startle response

TABLE 2–1. DSM-IV-TR diagnostic criteria for PTSD *(continued)*

E. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

Acute: if duration of symptoms is less than 3 months

Chronic: if duration of symptoms is 3 months or more

Specify if:

With Delayed Onset: if onset of symptoms is at least 6 months after the stressor

Source. Reprinted from American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition, Text Revision. Washington, DC, American Psychiatric Association, 2000. Copyright 2000, American Psychiatric Association. Used with permission.

matic events. Vrana and Lauterbach (1994) found that 84% of the undergraduate population at a major Midwestern university reported exposure, with 33% stating that they had experienced four or more traumatic events. Clearly, exposure to traumatic events is a common event in the lives of adult Americans.

National Prevalence of PTSD

Clearly, people who are exposed to traumatic life events do not always develop PTSD. In the study by Breslau et al. (1991), approximately 25% of those exposed to a traumatic event ultimately developed PTSD, resulting in a lifetime prevalence of nearly 9%. Norris (1992) found a current prevalence rate of PTSD of 5%, whereas Resnick and colleagues (1993) reported a 9% current rate of PTSD among women accompanied by a 12% lifetime rate. General-population estimates have also yielded high rates of PTSD. In Kessler and colleagues' (1995) National Comorbidity Survey, lifetime PTSD was found in 8% of the adult population.

Prevalence rates of PTSD in children have received little empirical attention to date; this is an area in clear need of additional research. Impeding progress in this area is a distinct lack of diagnostic measurement tools that reliably and validly evaluate PTSD in children. Among adolescents, the prevalence of PTSD was measured in a recent study by Kilpatrick and Saunders (1999). Using a nationwide probability sampling strategy, they found that PTSD was as common in adolescents as it is in adults, with estimates reaching 8%. Also similar to the adult population, PTSD in adolescence was more common among girls and minority groups. Moreover, the prevalence of PTSD increased linearly as the number of traumatic

events increased. The consistency of this linear relationship of exposure to traumatic events and the development of PTSD across populations, studies, and measurement tools strongly supports the key role that social and contextual factors play in the development of psychological disturbance.

PTSD also seems to occur at higher rates in populations that we characterize as high risk for the disorder. The National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al. 1990), a landmark epidemiological effort that was the first attempt by any country to quantify the psychological toll of a war on its soldiers, found that 30% of the 3.1 million Vietnam veterans developed PTSD at some time after the war. This represented some 958,000 cases of PTSD just from the Vietnam War. Fifteen percent (479,000) of these veterans still had PTSD 15 years after the conclusion of the war.

Similarly, individuals who have experienced rape are also at greater risk for developing PTSD. Kilpatrick and colleagues' (1992) National Women's Study found that 13% of American women had experienced a completed rape at some time in their lives. Nearly a third of them eventually developed PTSD as a result. This study yielded a strikingly high national prevalence rate of 4% for rape-related PTSD among American women.

Disasters also seem to induce PTSD at high rates. Green and colleagues (1992) studied the effects of the dam collapse in Buffalo Creek, West Virginia. They found a 59% lifetime rate of PTSD among survivors and a 25% current rate 14 years after the flooding.

The role of traumatic events and PTSD in the national problem of homelessness has recently been highlighted. The Better Homes Fund (1999) examined the rates of violence in the lives of homeless mothers and children and found staggering rates of physical and sexual abuse. Ninety-two percent of homeless mothers have been severely physically or sexually abused either as adults or as children. This abuse was typically at the hands of an intimate partner or a caregiver. Thirty-six percent of homeless mothers had diagnostic criteria for PTSD—three times the national rate for women in the general population. Although causality cannot be inferred from these correlational data, this study has generated important hypotheses about the possible impact of traumatic experiences and PTSD on the growing problem of homeless families.

Clearly, exposure to traumatic events is common in the United States, and it seems that the prevalence of PTSD in the general population is high, ranking in frequency behind only alcohol abuse, major depression, and social phobia. As a result, trauma exposure and PTSD represent a major challenge to the health care delivery system.

Most research on the prevalence of traumatic events and PTSD has been conducted in the United States. Many scholars believe that the prev-

alence of trauma exposure and PTSD is higher in the developing world, in part due to the lack of resources present there to avert disasters and to mitigate their aftermath (De Girolamo et al. 1996). Future research will determine the extent to which this is an accurate assessment of the situation in developing countries.

Gender differences in exposure and in the development of PTSD are suggested by the results of several epidemiological studies. It seems that males (60%) are more likely to be exposed to traumatic events than are females (50%), as was found in the National Comorbidity Survey (Kessler et al. 1995). Yet females are more likely to develop PTSD (12%) than are males (6%). This distinction may well be a real gender difference in the susceptibility to PTSD, possibly linked to biological, psychological, or social differences. Alternatively, it may be a direct function of the types of events to which men and women are differentially exposed. For example, women are more than 10 times as likely to be raped and men are twice as likely to have experienced a dangerous accident. The capacity of different events to induce PTSD at different rates is only now being explored systematically. These studies may very well provide information about the mechanisms associated with the preliminary gender differences in exposure and PTSD observed to date.

Recently, Breslau and colleagues (1998) found that assaultive violence (which included rape) induced the highest rate of PTSD of all the traumatic events measured. Yet the sudden and unexpected death of a loved one contributed the highest proportion of PTSD cases (31%) due to its high frequency in the population (60%). These researchers also found that PTSD persisted longer in women than in men; often persisted longer than 6 months (74%); and persisted longer when the traumatic event was directly rather than indirectly experienced. This study also found racial differences in the development of PTSD in that nonwhites were almost twice as likely to develop PTSD after exposure than were whites. These findings require continued study so that the mechanisms involved can be more fully understood.

Assessment of PTSD

Clinicians are increasingly recognizing that a sizable number of their clinical patients have experienced traumatic events and that the care of some patients is complicated by the presence of PTSD. Accordingly, there has been great interest among clinicians in the proper assessment and evaluation of patients with PTSD. Clearly, PTSD is assessed for many different purposes, and the goals of a particular assessment can determine the approach selected by the professional. Clinicians may wish to use a struc-

tured assessment as part of a diagnostic workup that includes a differential diagnosis and treatment planning. They may also be involved in forensic evaluations in which diagnostic accuracy is of utmost importance. Researchers may be interested in the frequency of occurrence of PTSD and the risk factors and complications associated with it (as in epidemiological studies). Moreover, researchers may be interested in high levels of diagnostic accuracy when studying biological and psychological parameters of the disorder, as in case-control studies. Each clinical and research situation requires a different solution depending on the assessment goals of the professional. For this reason, we present a general overview of the methods by which a clinician can evaluate the quality of available instruments.

The quality of psychological assessment is examined through the two psychometric characteristics of reliability and validity. Reliability is the consistency or replicability of test scores. Validity is the meaningfulness or accuracy inferences, interpretations, or decisions made on the basis of scores on tests or instruments. Test developers often report the consistency of tests over time (test-retest reliability), among different interviewers or raters (interrater reliability), or over the many items constituting a particular test (internal consistency). Reliability is reported for continuous measures as a simple correlation coefficient that can vary between 0.0 and 1.0. Reliability for dichotomous measures such as diagnostic interviews (indicating the presence or absence of a disorder) is often reported as a κ coefficient (Cohen 1960), which is also reported as 0.0–1.0 and is interpreted as the percentage agreement above chance.

Measures of validity include content validity, which represents the extent to which a test provides coverage of the domain of symptoms of a condition. The better the coverage of key symptoms, the better the content validity. If the measure of a disorder predicts something of interest or importance such as response to an intervention, it is said to have good criterion-related validity. Finally, if a measure is correlated with other measures of the same disorder it is said to have good construct validity.

Diagnostic instruments in the field of mental health are usually evaluated on the basis of their diagnostic utility, a type of criterion-related validity pertaining to a test's capacity to predict diagnostic status (Kraemer 1992). There are three steps in determining the diagnostic utility of a given instrument. First, a "gold standard" is selected. In psychological research, this is ordinarily a diagnosis made using a clinical interview, but it may also be a composite based on several sources of information. Second, both the gold standard and the newly developed test are administered to the experimental group of participants. Finally, a variety of cutoff scores are examined to determine their diagnostic utility or their ability to predict the diagnosis provided by the gold standard. Optimal cutoff scores for the test

are those that predict the greatest number of cases and noncases from the original sample.

All measures of a psychological disorder are imperfect (Gerardi et al. 1989). Two measures of the error contained within a test are false positives and false negatives. A false positive occurs when a patient scores above the cutoff but does not have a true case of the disorder. A false negative occurs when a patient scores below the given cutoff yet in fact has a true case of the disorder. Diagnostic utility is often described in terms of a test's sensitivity and specificity. These are measures of a test's performance that take into account errors made in prediction. Sensitivity is the measure of a test's true positive rate, or the probability that those with the disorder will score above a given cutoff score. Specificity is the true negative rate of a test, or the probability that those without the disorder will score below the cutoff for the test. Sensitivity is low if the test yields too many false negatives, whereas specificity is low if the test yields too many false positives.

Selection of tests and diagnostic instruments should include an examination by the clinician of relevant data on their psychometric properties. Inspecting rates of false positives, false negatives, sensitivity, and specificity can also inform the clinician of how an instrument performs. Conclusions drawn in clinical assessment are most accurate if they take into account these limitations.

Efforts to diagnose and assess patients for the presence of PTSD can include a range of different approaches. These include structured diagnostic interviews for PTSD and related comorbidity, psychological tests and questionnaires, psychophysiologic measures, medical records, and the use of multiple informants on the patient's behavior and experiences. We have referred to this approach as a multimethod approach to the assessment of PTSD (Keane et al. 1987).

Structured Diagnostic Interviews

It is standard practice in clinical research to employ a structured diagnostic interview to ensure that all PTSD symptoms are reviewed in detail. Diagnostic interviews combine the virtues of defining precisely how a diagnosis was made with the use of interviews that have known psychometric properties (i.e., reliability and validity). The use of structured diagnostic interviews in the clinical setting is less common, with perhaps the single exception of clinical forensic practice, where it is strongly encouraged (Keane 1995). Nonetheless, the use of diagnostic interviews in clinical settings may well improve diagnostic accuracy and improve treatment planning (Litz and Weathers 1992). The use of broad-based diagnostic interviews that cover the range of high-frequency diagnoses will assist the

clinician in that it will provide an evaluation not only of the target disorder but also the extent of clinical comorbidity that is present (Keane and Wolfe 1990; Weiss and Marmar 1997). Some of the available diagnostic interviews and their psychometric properties are described below.

Clinician-Administered PTSD Scale

Developed by the National Center for PTSD in Boston, the Clinician-Administered PTSD Scale (CAPS) was designed for use by trained, experienced clinicians (Blake et al. 1990). Consisting of 30 items, the CAPS assesses all 17 symptoms of PTSD as well as a range of the frequently observed associated features. Also contained in the CAPS are ratings for social and occupational functioning and an assessment of the validity of the responses by the patient. Like the PTSD-Interview and the Structured Interview for PTSD, the CAPS provides both dichotomous and continuous scores. Unique features of the CAPS are that it contains separate ratings for frequency and intensity of each symptom and that it possesses behaviorally anchored probe questions and scale values. Interviewers are trained to ask their own follow-up questions and to use their clinical judgment in arriving at the best ratings.

If administered completely (i.e., all questions regarding associated features, functional impairments, and validity ratings), the CAPS takes approximately an hour to complete. If only the diagnostic symptoms are assessed, the time for administration is cut in half.

Psychometric data on performance of the CAPS demonstrate unusual strength in identifying cases and noncases of PTSD. Across three clinicians and 60 separate male veteran subjects, Weathers and colleagues (1992) found test-retest correlations between 0.90 and 0.98. Internal consistency was equally impressive, with an α of 0.94 across all three primary symptom clusters. Correlations with other established measures of PTSD yielded strong evidence for the construct validity of the CAPS. The correlation of the CAPS with the Mississippi Scale was 0.91; correlation with the Keane PTSD Scale of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) was 0.77; and correlation with the Structured Clinical Interview for DSM (SCID) PTSD symptom score was 0.89. Correlations with a measure of antisocial personality disorder were low, as was predicted by the multitrait-multimethod study design.

Used as a continuous measure, the CAPS was found to have a sensitivity of 84%, specificity of 95%, efficiency of 89%, and κ of 0.78 against the SCID. Using the CAPS as a diagnostic measure, a κ of 0.72 was found compared with the SCID diagnosis. These findings establish that the CAPS is a sound measure of PTSD with excellent psychometric properties, whether it is used as a diagnostic or a continuous measure. Replications of these

findings with male and female motor vehicle accident survivors (Blanchard et al. 1995) and with patients with serious mental illnesses of both sexes (Mueser et al. 1999) indicated the generalizability of these results across populations, races, and sexes. A recent publication carefully explicated nine different scoring algorithms for the CAPS and their implications for diagnostic accuracy, reliability, and validity coefficients (Weathers et al. 1999).

Structured Clinical Interview for DSM

The SCID (Spitzer et al. 1994) is the most widely used interview to assess Axis I and Axis II psychiatric disorders. It consists of separate modules for the most common diagnostic categories. Although the full SCID can be time consuming to administer, it does provide information across a broad range of clinical conditions. In many clinical settings, the SCID is used to systematically assess only the most frequently encountered conditions. This is economical in terms of time and still provides an examination across key conditions. For use in a trauma clinic, it is recommended that the anxiety disorder, affective disorder, and substance abuse disorder modules and the psychotic screen be employed. This provides a fairly comprehensive examination of the conditions that are frequently comorbid with PTSD and provides a systematic way to ensure that a patient does not show signs of psychoses—conditions that would require a different initial set of clinical interventions.

The PTSD module of the SCID appears to be both clinically sensitive and reliable. Keane and colleagues (1998) examined the interrater reliability of the SCID by asking a second interviewer to listen to audio tapes of an initial interview. They found a κ of 0.68 and agreement across lifetime, current, and never PTSD of 78%. Similarly, in a sample of patients who were reinterviewed within a week by a different clinician, these researchers found a κ of 0.66 and diagnostic agreement of 78%.

The primary limitation of the SCID is that it permits only a dichotomous rating of a symptom (present or absent), placing clinicians in a forced-choice situation. Most clinicians agree that psychological symptoms occur in a dimensional rather than a dichotomous fashion, and so the SCID seems limited by the use of the present/absent scoring algorithm. Several options have evolved in the field as a result of this limitation. These are described later in this chapter.

Anxiety Disorders Interview Schedule–Revised

Developed by DiNardo and Barlow (1988), the Anxiety Disorders Interview Schedule–Revised (ADIS) is a structured diagnostic interview that focuses primarily on the anxiety and affective disorders. The ADIS uses a

Likert-type scaling procedure for symptoms and is thus capable of being analyzed in multiple ways to determine the extent to which a symptom is present or absent. Psychometric properties of the ADIS PTSD module have been assessed in two separate studies, with mixed results. In the first study (Blanchard et al. 1986), a small group of combat veterans were assessed by two independent interviewers; excellent sensitivity (1.0) and specificity (0.91) were found. In a community-based study (DiNardo et al. 1993), the results were less impressive and the hit rates were less stable.

PTSD-Interview

Watson and colleagues' (1991) PTSD-Interview yields both dichotomous and continuous scores. The authors report strong test-retest reliability (0.95) and internal consistency (α=0.92), as well as strong sensitivity (0.89), specificity (0.94), and κ (0.82) compared with the Diagnostic Interview Schedule (Robins et al. 1981).

The PTSD-Interview appears to have excellent psychometric properties but differs in administrative format from most other structured diagnostic clinical interviews. With the PTSD-Interview, patients are provided a copy of the scale to read along with the interviewer. From this copy of the scale, they are asked to give to the clinician their rating on the Likert scale for each of the symptoms. This format has much in common with self-report questionnaires, yet it deviates from the other diagnostic scales in that it does not allow clinicians to make ratings of their own and use their expertise and experience.

Structured Interview for PTSD

The Structured Interview for PTSD (SI-PTSD) was developed by Davidson and colleagues (1989). As with the PTSD-Interview, it also yields both dichotomous and continuous measures of PTSD symptoms. As a result, it appears to be a useful instrument for diagnosing PTSD and measuring symptom severity. Symptoms are rated by the clinician on five-point Likert scales, and the focus for the clinician is on symptom severity. It possesses initial probe questions and provides helpful follow-up questions to promote a more thorough understanding of the patient's symptom experiences. In a study of male combat veterans, the Davidson and colleagues found sensitivity of 0.96 and specificity of 0.80, suggesting sound performance.

PTSD Symptom Scale Interview

Developed by Foa and colleagues (1993), the PTSD Symptom Scale Interview (PSS-I) possesses many strong clinical features that warrant its consideration for clinical and research use. Consisting of the 17 criteria of the

PTSD diagnosis, the PSS-I uses Likert-type rating scales for each of the criterion symptoms. It can be scored as a continuous and dichotomous measure of PTSD and takes approximately 20 minutes for completion. Administering this measure to 118 women with sexual assault histories, Foa and colleagues (1993) found excellent interrater reliability, diagnostic sensitivity of 0.88, and specificity of 0.96. Test-retest reliability over 1 month was also reported to be strong.

The advantages of the PSS-I are its relative brevity, its promising psychometric properties, and its use of Likert rating scales that provide both a dichotomous and a continuous scoring routine. Another strength of this interview is its development and validation with sexual assault survivors, a population of great interest and importance clinically.

Self-Report PTSD Questionnaires

Several self-report measures have been developed as a time-efficient and cost-efficient method for obtaining information on PTSD symptoms. These measures enjoy widespread acceptance and use due to ease of administration and scoring, and they are also useful adjuncts to the structured diagnostic instruments. They can also be invaluable when used as screens for PTSD. These measures are most frequently used as continuous measures of PTSD, but specific cutoff scores can be used to arrive at a diagnosis of PTSD.

PTSD Checklist

Developed (as was the CAPS) by researchers at the National Center for PTSD in Boston, the PTSD Checklist (PCL) comes in two versions: one for civilians and the other for military personnel. The scale contains the 17 items of the DSM diagnostic criteria scored on a five-point Likert scale. Weathers and colleagues (1993) examined its psychometric properties and found excellent internal consistency ($\alpha = 0.97$), excellent test-retest reliability over a 2- to 3-day period (0.96), and strong correlations with other measures of PTSD. The association with the Mississippi Scale was 0.93, association with the Keane scale was 0.77, and association with the Impact of Event Scale was 0.90. Blanchard and colleagues (1996) used the PCL in their studies of motor vehicle accident victims and found that the correlation of the PCL with the CAPS was 0.93 and overall diagnostic efficiency was 0.90 compared with the CAPS. The properties of the PCL with other populations have yet to be reported in the literature.

Impact of Event Scale–Revised

Initially developed by Horowitz and colleagues (1979), the Impact of Event Scale (IES) was revised by Weiss and Marmar (1997) to incorporate the

symptoms of hyperarousal for PTSD (criterion D). The original scale contained only reexperiencing symptoms and avoidance/numbing symptoms and needed to be revised to more closely parallel the diagnostic picture. Although the authors provided some preliminary data, more information is needed about the reliability and validity of the revision. The most frequently used measure of PTSD, the original IES possessed good psychometric properties. Similar studies with the revised instrument will ensure its continued use in clinics and research settings.

Mississippi Scale for Combat-Related PTSD

The Mississippi Scale (Keane et al. 1988) is a 35-item scale designed to measure combat-related PTSD. The items were selected from an initial pool of 200 items generated by experts to closely match the DSM-III criteria for the disorder. The Mississippi Scale has excellent psychometric properties, with an α of 0.94 and test-retest reliability of 0.97 over a 1-week interval. Using a cutoff score of 107, the Mississippi Scale had strong sensitivity (0.93) and specificity (0.89).

These results were replicated in an independent laboratory by McFall et al. (1990), who found that the Mississippi Scale was highly correlated with the SCID PTSD module. These findings suggest that the Mississippi Scale, widely used in clinical and research settings serving veterans, is a valuable self-report tool.

Keane PTSD Scale of the MMPI-2

Originally derived from the MMPI Form R, the Keane PTSD Scale now consists of 46 items empirically drawn from the MMPI-2 (Keane et al. 1984; Lyons et al. 1992). The original report on the scale indicated that the Keane PTSD Scale correctly classified some 82% of the 200 subjects in the study. Subsequent studies confirmed these findings in combat veteran populations (Watson et al. 1986).

In terms of reliability, Graham (1990) found the Keane PTSD Scale to have strong internal consistency (0.85–0.87) and test-retest reliability (0.86–0.89). Although only a few studies have been conducted to date on the Keane PTSD Scale in nonveteran populations, the data presented appear to be promising (Koretzky and Peck 1990). More research is needed in this area, especially in the area of forensic psychology, where the MMPI-2 is frequently employed because of its validity indexes.

Penn Inventory for Posttraumatic Stress

The Penn Inventory is a 26-item questionnaire developed by Hammerberg (1992). Its psychometric properties have been examined in multiple trauma populations, and its specificity is comparable to that of the Mississippi

Scale, whereas its sensitivity is only slightly lower. It has been used with accident victims, veterans, and general psychiatric patients. It has primarily been employed with samples of male patients.

Posttraumatic Diagnostic Scale

Developed by Foa and colleagues (1997), the Posttraumatic Diagnostic Scale (PTDS) is derived from the DSM criteria directly. The items of the PTDS map directly onto the DSM-IV criteria for PTSD, and thus the questionnaire is 17 questions long. The PTDS begins with a 12-question checklist to elucidate the traumatic events to which an individual might have been exposed. Next, the patient is asked to indicate which of the events experienced has bothered him or her the most in the past month. The patient then rates his or her reactions to the event at the time of its occurrence to determine if the event fits both criteria A1 and A2.

The patient then rates on a single four-point scale the intensity and frequency of each of the 17 symptoms of PTSD that he or she has experienced in the past 30 days. The final section of the scale asks for self-ratings of impairment across nine areas of life functioning. This scale was validated using several populations, including combat veterans, accident victims, sexual and nonsexual assault survivors, and persons who had experienced a range of other traumatic events.

The psychometric analyses proved to be exceptional. For internal consistency, the coefficient α was 0.92 overall; test-retest reliability for the diagnosis of PTSD over a 2- to 3-week interval was also high (κ=0.74). For symptom severity the test-retest correlation was 0.83. Compared with a SCID diagnosis of PTSD, a κ coefficient of 0.65 was obtained with 82% agreement; the sensitivity of the test was 0.89, and its specificity was 0.75. Clearly, this self-report scale functioned well in comparison to the clinician ratings obtained in the SCID. It is a useful self-report and screening device for measuring PTSD and its symptom components.

Los Angeles Symptom Checklist

Consisting of 43 items scored on Likert-type scales, the Los Angeles Symptom Checklist (LASC) has been extensively studied across different populations (males and females, adults and adolescents, various trauma types). King and colleagues (1995) examined the psychometric properties of the LASC and found it to possess high internal consistency (α values ranging from 0.88 to 0.95) and test-retest reliability over a 2-week interval (0.90 and 0.94). Its strengths include the various ways in which it can be scored (continuously or dichotomously) and its inclusion of a range of associated features, signs of distress, and functional problems. Using only the 17-item PTSD index, King and colleagues (1995) found sensitivity of

0.74, specificity of 0.77, and an overall hit rate of 76% compared with a SCID diagnosis.

The use of these self-report questionnaires in a wide range of clinical and research contexts seems well supported by the extant data. It is clear that they can be successfully employed to measure PTSD symptoms when administering a structured diagnostic interview is not feasible or practical. Many of the measures can be used interchangeably, as the findings appear to be robust for the minor variations in methods and approaches involved. In selecting a particular instrument the clinician is encouraged to examine the data for that instrument for the population on which it is to be employed. In so doing, the clinician is likely to maximize the accuracy and efficiency of the test employed.

Psychophysiologic Measures

Research on biologically based measures of PTSD has grown tremendously in the past 10 years. Findings suggest that PTSD alters a wide range of physiologic functions (Yehuda 1997) and may also affect structural components of the brain (Bremner et al. 1995). To date, these findings have not been subjected to rigorous psychometric testing (i.e., utility analyses) to determine the extent to which these deviations are predictive of PTSD and non-PTSD cases. The primary exception to this conclusion is in the area of psychophysiologic reactivity, which from the start examined diagnostic accuracy (e.g., Blanchard et al. 1982; Malloy et al. 1983; Pitman et al. 1987).

The findings in this area clearly point to the capacity of psychophysiologic indices to identify and classify cases of PTSD on the basis of reactivity to auditory-, audiovisual-, and imagery-based cues. Measures have included heart rate, blood pressure, skin conductance, and electromyography. Studies covered the range of trauma survivors and include motor vehicle accidents, combat veterans from available eras, female sexual assault survivors, and survivors of terrorism. In perhaps the largest study of its kind, Keane and colleagues (1998) examined the responses of over 1,000 combat veterans to audiovisual- and imagery-based cues of combat experiences. The results supported the presence of elevated psychophysiologic arousal and reactivity in the participants, more than two-thirds of whom were correctly classified as having or not having PTSD.

Clearly, psychophysiologic assessment is costly in terms of time, patient burden, and cost. Yet in cases where much is at stake, it might be helpful to employ this assessment strategy clinically (Prins et al. 1995). Widespread adoption of this method of assessment is not expected due to the costs, the expertise required, and the success of other economical methods of assessment such as the diagnostic interviews and the psychological tests that are available.

As more information is collected on measures of the hypothalamic-pituitary-adrenocorticotropic axis, it is indeed possible that this system and measures of it could be useful adjuncts to the diagnosis of PTSD. In particular, indexes of cortisol, norepinephrine, and their ratio appear ready for an intensive examination for their capacity to improve diagnostic hit rates for PTSD above and beyond the use of diagnostic interviews and psychological tests (Yehuda et al. 1995).

Monitoring Outcomes in PTSD Treatment

Since the growth of managed care in the 1990s, there has been an increased need for clinicians to monitor the effects of their treatment interventions. Whether the intervention is psychopharmacologic, psychological, or a combination of the two, the use of psychological tests or questionnaires that possess excellent psychometric properties is recommended. For example, Keane and Kaloupek (1982), using a single-subject design, presented the first empirical evidence that cognitive-behavioral treatments for PTSD had promise. In that study, we employed subjective units of distress (SUDS) (0–10 ratings) within treatment sessions to monitor changes in the presentation of traumatic memories in a prolonged-exposure treatment paradigm. Between sessions, we used the Spielberger State Anxiety Inventory to monitor levels of anxiety and distress throughout the course of the 19 treatment sessions.

Similarly, Fairbank and Keane (1982) treated combat veterans with PTSD using a multiple-baseline design across traumatic memories. Measures to monitor change included SUDS ratings as well as heart rate and skin conductance response. Systematic improvement was observed in the treatment of traumatic memories, and this was evidenced in changes in SUDS ratings, heart rate, and number of skin conductance responses. Although this form of monitoring is intensive, it suggests that the level of change transcends self-report into the physiologic domains and thus is a rigorous assessment of the impact of the treatment provided.

With the expanding emphasis on the provision of problem-focused treatments, the need for evaluation of the effectiveness of treatment to payers and patients, and the growing use of quality assurance to monitor care in behavioral health programming, there is a corresponding need for the use of psychometrically sound instrumentation. Psychological tests and questionnaires often possess many virtues, including test-retest reliability, internal consistency, and indicators of validity. Moreover, they frequently present normative information against which an individual's performance can be compared with either the general population or target populations of interest (Kraemer 1992). For all these reasons, psychological tests are

strongly warranted for consideration when clinicians are considering tools to monitor the outcomes of their interventions.

At least since the appearance of DSM-III (American Psychiatric Association 1980), the zeitgeist for monitoring treatment outcome has focused on symptomatology. Specifying symptom-level targets for change was a major advance in the methodology of psychotherapy outcome research. This focus on the microcosmic level of analysis yielded considerable benefit to the field, but unfortunately was at the expense of broader, macrocosmic levels of evaluation. This trend has been modified in recent years. Today, outcomes are measured at the symptom level, the individual level, the system level (i.e., economic or cost analyses), and at the social or contextual level. All are important and all can provide valuable information for clinicians and patients alike.

Most clinicians are well versed in the use of measures of anxiety, depression, and psychotic behavior and broad measures of psychopathology. Many appropriate measures of these domains exist, and clinicians are encouraged to look for measures that are suitable for their particular circumstances and settings. Use of these measures at intervals (e.g., daily, weekly, monthly, quarterly) during the course of treatment will provide knowledge of the patient's status and communicate to the clinician the extent to which the patient is changing in the desired directions.

Still, clinicians are encouraged to adopt additional measures to monitor treatment progress. These measures might incorporate the use of the SF-36 Health Survey, a broad-based measure of functioning that is widely used in the health care industry. Complete with many different scales to measure components of functioning, the SF-36 is easily administered, is well tolerated by patients, and is quickly becoming a standard in the field (Ware 1999).

Other instruments are available to measure other domains of patient satisfaction and services satisfaction (Atkisson et al. 1999), as well as the dimensions of marital satisfaction and quality of life (e.g., Frisch 1993). Selection of the most appropriate measure of outcome is fundamentally a clinical decision, one that needs to rest with the provider in consultation with the patient.

Summary

Diagnosing, assessing, and monitoring outcomes in PTSD is a topic of growing interest and concern in the mental health field (Wilson 1998). Since the inclusion of PTSD in the diagnostic nomenclature of the American Psychiatric Association, there has been considerable progress in understanding and evaluating the psychological consequences of exposure

to traumatic events. Conceptual models of PTSD assessment have evolved (Keane 1991), psychological tests have been developed (Foa et al. 1998; Norris and Riad 1997), diagnostic interviews have been validated (Davidson et al. 1989; Foa et al. 1993; Weathers et al. 1992), and subscales of existing tests have been created to assess PTSD: for example, the MMPI-2 (Keane et al.1984) and the Symptom Checklist–90 Revised (Saunders et al. 1990). We can rightly conclude that the assessment devices available to assess PTSD are comparable to or better than those available for any other disorder in DSM-IV. Multiple instruments have been developed to cover the range of needs of the clinician. The data on these instruments are nothing short of outstanding.

The assessment of PTSD in clinical settings focuses on more than the presence, absence, and severity of PTSD. A comprehensive assessment strategy would certainly gather information about an individual's family history, life context, symptoms, beliefs, strengths, weaknesses, support system, and coping abilities. This would assist in the development of an effective treatment plan for the patient. The primary purpose of this chapter is to examine the quality of a range of different instruments used to diagnose and assess PTSD. However, the comprehensive assessment of a patient needs to include indexes of social and occupational functioning. Finally, a satisfactory assessment ultimately relies on the clinical and interpersonal skills of the clinician, because many topics related to trauma are inherently difficult for the patient to disclose to others.

This chapter is not intended to be comprehensive in its review of the psychometric properties of all instruments available. The goal was to provide a heuristic structure that clinicians might employ when selecting a particular instrument for their clinical purposes. By carefully examining the psychometric properties of an instrument, the clinician can make an informed decision about the appropriateness of a particular instrument for the task at hand. Instruments that provide a full utility analysis (e.g., sensitivity, specificity, hit rate) for the clinician to examine do much to assist clinicians in making their final judgments. Furthermore, instruments that are developed and evaluated on multiple trauma populations, for both sexes, and with different racial, cultural, and age groups are highly desirable; these are objectives for future study.

References

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition. Washington, DC, American Psychiatric Association, 1980

American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. Washington, DC, American Psychiatric Association, 1994

Atkisson CC, Greenfield TK: The UCSF Client Satisfaction Scales, in The Use of Psychological Testing for Treatment Planning and Outcomes Assessment, 2nd Edition. Edited by Maruish M. Hillsdale, NJ, Erlbaum, 1999

Blake DD, Weathers FW, Nagy LM, et al: A clinical rating scale for assessing current and lifetime PTSD: The CAPS-1. Behavior Therapist 18:187–188, 1990

Blanchard EB, Kolb LC, Pallmeyer TP, et al: A psychophysiological study of post traumatic stress disorder in Vietnam veterans. Psychiatr Q 54:220–229, 1982

Blanchard EB, Gerardi RJ, Kolb LC, et al: Utility of the Anxiety Disorders Interview Schedule (ADIS) in the diagnosis of the post-traumatic stress disorder in Vietnam veterans. Behav Res Ther 24:577–580, 1986

Blanchard EB, Hickling EJ, Taylor AE, et al: Effects of varying scoring rules of the Clinician-Administered PTSD Scale (CAPS) for the diagnosis of post-traumatic stress disorder in motor vehicle accident victims. Behav Res Ther 33:471–475, 1995

Blanchard EB, Jones-Alexander J, Buckley TC, et al: Psychometric properties of the PTSD checklist (PCL). Behav Res Ther 34:669–673, 1996

Bremner JD, Randall TM, Scott RA, et al: MRI-based measures of hippocampal volume in patients with PTSD. Am J Psychiatry 152:973–981, 1995

Breslau N, Davis GC, Andreski P, et al: Traumatic events and posttraumatic stress disorder in an urban population of young adults. Arch Gen Psychiatry 48:216–222, 1991

Breslau N, Kessler RC, Chilcoat HD, et al: Trauma and posttraumatic stress disorder in the community: the 1996 Detroit area survey of trauma. Arch Gen Psychiatry 55:626–632, 1998

Cohen J: A coefficient of agreement for nominal scales. Educational and Psychological Measurement 20:37–46, 1960

Davidson J, Smith R, Kudler H: Validity and reliability of the DSM-III criteria for posttraumatic stress disorder: experience with a structured interview. J Nerv Ment Dis 177:336–341, 1989

De Girolamo G, McFarlane AC: The epidemiology of PTSD: a comprehensive review of the international literature, in Ethnocultural Aspects of Posttraumatic Stress Disorder. Edited by Marsella A, Friedman M, Gerrity E, et al. Washington, DC, American Psychological Association, 1996

DiNardo P, Barlow D: Anxiety Disorders Interview Schedule—Revised. Albany, NY, Center for Phobia and Anxiety Disorders, 1988

DiNardo P, Moras K, Barlow D, et al: Reliability of DSM-III-R anxiety disorder categories using the ADIS-R. Arch Gen Psychiatry 50:251–256, 1993

Fairbank JA, Keane TM: Flooding for combat-related stress disorders: assessment of anxiety reduction across traumatic memories. Behavior Therapy 13:499–510, 1982

Foa EB, Riggs DS, Dancu CV, et al: Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. J Trauma Stress 6:459–473, 1993

Foa EB, Cashman L, Jaycox L, et al: The validation of a self-report measure of posttraumatic stress disorder: the Posttraumatic Diagnostic Scale. Psychol Assess 9:445–451, 1997

Gerardi R, Keane TM, Penk WE: Utility: sensitivity and specificity in developing diagnostic tests of combat-related post-traumatic stress disorder (PTSD). J Clin Psychol 45:691–703, 1989

Graham J: MMPI-2: Assessing Personality and Psychopathology. New York, Oxford University Press, 1990

Green BL, Lindy JD, Grace MC, et al: Chronic posttraumatic stress disorder and diagnostic comorbidity in a disaster sample. J Nerv Ment Dis 180:760–766, 1992

Hammerberg M: Penn Inventory for Posttraumatic Stress Disorder: Psychometric properties. Psychol Assess 4:67–76, 1992

Horowitz MJ, Wilner N, Alvarez W: Impact of Event Scale: a measure of subjective distress. Psychosom Med 41:209–218, 1979

Keane TM: Guidelines for the forensic psychological assessment of PTSD claimants, in Post-Traumatic Stress Disorder in Litigation. Edited by Simon RI. Washington, DC, American Psychiatric Press, 1995, 99–115

Keane TM, Kaloupek DG: Imaginal flooding in the treatment of posttraumatic stress disorder. J Consult Clin Psychol 50:138–140, 1982

Keane TM, Wolfe J: Comorbidity in post-traumatic stress disorder: an analysis of community and clinical studies. Journal of Applied Social Psychology 20:1776–1788, 1990

Keane TM, Malloy PF, Fairbank JA: Empirical development of an MMPI subscale for the assessment of combat-related posttraumatic stress disorder. J Consult Clinical Psychol 52:888–891, 1984

Keane TM, Wolfe J, Taylor KL: Post-traumatic stress disorder: evidence for diagnostic validity and methods of psychological assessment. J Clin Psychol 43:32–43, 1987

Keane TM, Caddell JM, Taylor KL: Mississippi Scale for Combat-Related Posttraumatic Stress Disorder: three studies in reliability and validity. J Consult Clin Psychol 56:85–90, 1988

Keane TM, Kolb LC, Kaloupek DG, et al: Utility of psychophysiological measurement in the diagnosis of post-traumatic stress disorder: results from a Department of Veterans Affairs cooperative study. J Consult Clin Psychol 66:914–923, 1998

Keane TM, Weathers FW, Foa EB: Diagnosis and assessment, in Effective Treatments for PTSD. Edited by Foa EB, Keane TM, Friedman MJ. New York, Gulford, 2000, pp 18–36

Kessler RC, Sonnega A, Bromet E, et al: Posttraumatic stress disorder in the National Comorbidity Survey. Arch Gen Psychiatry 52:1048–1060, 1995

Kilpatrick D, Edmonds CN, Seymour AK: Rape in America: A Report to the Nation. Arlington, VA, National Victims Center, 1992

Kilpatrick D, Saunders B: Prevalence and Consequences of Child Victimization: Results From the National Survey of Adolescents. Washington, DC, National Institute of Justice, 1999

King LA, King DW, Leskin G, et al: The Los Angeles Symptom Checklist: a self-report measure of posttraumatic stress disorder. Assessment 2:1–17, 1995

Koretzky MB, Peck AH: Validation and cross-validation of the PTSD subscale of the MMPI with civilian trauma victims. J Clin Psychol 46:296–300, 1990

Kraemer HC: Evaluating medical tests: objective and quantitative guidelines. Newbury Park, CA, Sage Press, 1992

Lyons JA, Keane TM: Keane PTSD Scale: MMPI and MMPI-2 update. J Trauma Stress 5:111–117, 1992

Malloy PF, Fairbank JA, Keane TM: Validation of a multimethod assessment of posttraumatic stress disorders in Vietnam veterans. J Consult Clin Psychol 51(4):488–494, 1983

McFall ME, Smith DE, Mackay PW, et al: Reliability and validity of Mississippi Scale for Combat-Related Posttraumatic Stress Disorder. Psychol Assess 2:114–121, 1990

Mueser KT, Salyers M, Rosenberg SD, et al: Reliability of trauma and PTSD assessments in persons with severe mental illness. Paper in submission, 1999

Norris F: Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. J Consult Clin Psychol 60:409–418, 1992

Norris F, Riad J: Standardized self-report measures of civilian trauma and posttraumatic stress disorder, in Assessing Psychological Trauma and PTSD. Edited by Wilson J, Keane TM. New York, Guilford, 1997

Pitman RK, Orr SP, Forgue DF, et al: Psychophysiological assessment of posttraumatic stress disorder imagery in Vietnam combat veterans. Arch Gen Psychiatry 44:970–975, 1987

Prins A, Kaloupek DG, Keane TM: Psychophysiological evidence for autonomic arousal and startle in traumatized adult populations, in Neurobiological and Clinical Consequences of Stress: From Normal Adaptation of PTSD. Edited by Friedman MJ, Charney DS, Deutch AY. New York, Raven, 1995

Resnick HS, Kilpatrick DG, Dansky BS, et al: Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. J Consult Clin Psychol 61:984–991, 1993

Robins LN, Helzer JE, Croughan JL, et al: National Institute of Mental Health diagnostic interview schedule: its history, characteristics, and validity. Arch Gen Psychiatry 38:381–389, 1981

Saunders BE, Arata CM, Kilpatrick DG: Development of a crime-related posttraumatic stress disorder scale for women within the Symptom Checklist–90 Revised. J Trauma Stress 3:439–448, 1990

Spitzer R, Williams J, Gibbon M, et al: Structured Clinical Interview for DSM-IV (SCID). New York, Biometrics Research Department, New York State Psychiatric Institute, 1994

Vrana S, Lauterbach D: Prevalence of traumatic events and post-traumatic psychological symptoms in a nonclinical sample of college students. J Trauma Stress 7:289–302, 1994

Ware J: The SF-36 Health Survey, in The Use of Psychological Testing for Treatment Planning and Outcomes Assessment, 2nd Edition. Edited by Maruish M. Hillsdale, NJ, Erlbaum, 1999

Watson CG, Kucala T, Manifold V: A cross-validation of the Keane and Penk MMPI scales as measures of post-traumatic stress disorder. J Clin Psychol 42:727–732, 1986

Watson C, Juba MP, Manifold V, et al: The PTSD interview: rationale, description, reliability, and concurrent validity of a DSM-III-based technique. J Clin Psychol 47:179–188, 1991

Weathers FW, Blake DD, Krinsley KE, et al: The Clinician-Administered PTSD Scale: reliability and construct validity. Paper presented at 26th annual convention of the Association for Advancement of Behavior Therapy, Boston, November 1992

Weathers FW, Litz BT, Herman DS, et al: The PTSD Checklist (PCL): reliability, validity, and diagnostic utility. Paper presented at the 9th annual meeting of the International Society for Traumatic Stress Studies, San Antonio, TX, October 1993

Weathers FW, Ruscio A, Keane TM: Psychometrics properties of nine scoring rules for the Clinician-Administered PTSD Scale (CAPS). Psychological Assessment 11:124–133, 1999

Weiss DS, Marmar CR: The Impact of Event Scale–Revised, in Assessing Trauma and Posttraumatic Stress Disorder: A Clinician's Handbook. Edited by Wilson JP, Keane TM. New York, Guilford, 1997, pp 399–411

Yehuda R: Sensitization of the hypothalamic-pituitary-adrenal axis in posttraumatic stress disorder. Ann N Y Acad Sci 821:57–75, 1997

Yehuda R, Giller E, Southwick S, et al: Hypothalamic-pituitary-adrenal alterations in PTSD, in Neurobiological and Clinical Adaptations to Stress: From Normal Adaptations to PTSD. Edited by Friedman M, Charney D, Deutch A. New York, Raven, 1995